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ADAMS & WILKS

ATTORNEYS AND COUNSELORS AT LAW
50 BROADWAY
31st FLOOR
NEW YORK, NEW YORK 10004

BRUCE L. ADAMS
VAN C. WILKS•

JOHN R. BENEFIEL•
PAUL R. HOFFMAN
TAKESHI NISHIDA
FRANCO S. DE LIGUORI°

• NOT ADMITTED IN NEW YORK
° REGISTERED PATENT AGENT

RIGGS T. STEWART
(1924-1993)

TELEPHONE
(212) 809-3700

FACSIMILE
(212) 809-3704

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PATENT & TRADEMARK OFFICE

June 13, 2001

COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Attn: Board of Patent Appeals and Interferences

Re: Patent Application of Akihiro IINO et al.
Serial No. 09/290,046
Filed: April 12, 1999
Group Art Unit - 2834
Examiner: Mark O. Budd
Docket No. S004-3645

S I R:

Appellants submit herewith, in triplicate, their brief on appeal in connection with the captioned application. A check in the amount $310.00 is enclosed herewith to cover the required appeal fee. Should the check prove insufficient for any reason, authorization is hereby given to charge any deficiency to Deposit Account No. 01-0268.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Appellants

By: Bruce L. Adams
Bruce L. Adams
Reg. No. 25,386

BLA:db
Enclosures

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JUN 19 2001
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#11/Appeal Brief. Hawkins 6/25/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Application of	:	
Akihiro IINO et al.	:	
Serial No. 09/290,046	:	Group Art Unit - 2834
Filed: April 12, 1999	:	Examiner - Mark O. Budd
For: ULTRASONIC MOTOR AND ELECTRONIC APPARATUS EQUIPPED WITH ULTRASONIC MOTOR	:	Docket No. S004-3645

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COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, DC 20231

BRIEF ON APPEAL

S I R:

An appeal has been taken from the final rejection of claims 1-4, 6-14, 22-32 and 35-51[1], and appellants present their brief in support of the appeal.

(1) Real Party of Interest

The real party of interest in this appeal is Seiko Instruments Inc.

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1 Claims 5, 33 and 34, which are also pending in this application, have been allowed by the Examiner in the final Office Action dated January 10, 2001.

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(2) <u>Related Appeals and Interferences</u>

Appellants and appellants' counsel are aware of no other appeals or interferences which will directly affect or be directly affected by or have a direct bearing upon the Board's decision in the present appeal.

(3) <u>Status of Claims</u>

Claims 48-51 stand finally rejected under 35 U.S.C. §112, second paragraph, for indefiniteness. Claims 1-4, 22-32 and 48-51 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,692,649 to Izukawa et al. ("Izukawa"), U.S. Patent No. 5,001,404 to Kataoka or U.S. Patent No. 5,198,714 to Salomon et al. ("Salomon") in view of U.S. Patent No. 5,780,955 to Iino et al. ("Iino '955) or U.S. Patent No. 6,064,138 to Iino et al. ("Iino '138"). Claims 6-14 and 35-47 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,763,981 to Okazaki et al. ("Okazaki") in view of U.S. Patent No. 5,406,160 to Shirasaki or U.S. Patent No. 5,438,229 to Ohtsuchi et al. ("Ohtsuchi") and further in view of Iino '955 or Iino '138. In an amendment after final filed by facsimile on March 29, 2001, independent claim 48 was amended to overcome the indefiniteness rejection of claims 48-51 and independent claims 2, 3, 6, 11 and 12 were amended to overcome the prior rejections raised by the Examiner in the final

Office Action. In an Advisory Action dated April 4, 2001, the Examiner advised that the amendment after final overcomes the indefiniteness rejection of claims 48-51 but does not overcome the prior art rejection of claims 1-4, 6-14, 22-32 and 35-51 under 35 U.S.C. §103(a). Claims 5, 33 and 34 stand allowed.

(4) Status of Amendments

In response to a final rejection dated January 10, 2001, an amendment after final was filed by facsimile on March 29, 2001. The amendment after final presented amendments to overcome the indefiniteness rejection of claims 48-51 and the prior art rejections of claims 1-4, 6-14, 22-32 and 35-51 under 35 U.S.C. §103(a). In an Advisory Action dated April 4, 2001, the Examiner indicated that the amendment after final would be entered upon the filing of an appeal. No further amendment after final was filed, and no amendment stands unentered.

(5) Summary of Invention

The present invention is directed to an ultrasonic motor and to an electronic apparatus equipped with the ultrasonic motor.

An embodiment of an ultrasonic motor according to the present invention embodied in the claims is shown in Figs. 1-2, 3A-3C, 4A-4B, 5A-5B and 6A-6B. The ultrasonic motor

comprises a piezoelectric vibrating member 5 having a detecting polarized portion 7c for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion 7a for receiving the drive signal to oscillate the piezoelectric vibrating member in self-excited oscillation to produce a drive force (specification, pg. 24, line 3 to pg. 26, line 6). According to the present invention, the detecting polarized portion 7c is disposed at a portion of the piezoelectric vibrating member 5 which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member (specification, pg. 26, lines 7-15, and pg. 31, lines 13-19; Figs. 4A, 6A). An amplifying circuit 13 amplifies the drive signal detected by the detecting polarized portion 12c and inputs the amplified signal to the driving polarized portion 12a to oscillate the piezoelectric vibrating member 5 (specification, pg. 30, lines 10-14, 21-25 and pg. 31, lines 1-5).

Another embodiment of the ultrasonic motor according to the present invention is shown in Figs. 9-10. The ultrasonic motor comprises a piezoelectric vibrating member 16 having a detecting polarized portion 18c for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion 18a for receiving the drive signal to produce a flexion vibration wave for

oscillating the piezoelectric vibrating member 16 in self-excited oscillation to produce a drive force (specification, pg. 35, lines 1-23). The detecting polarized portion 18c is disposed at a portion of the piezoelectric vibrating member 16 which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member 16, and is disposed on the piezoelectric vibrating member 16 at a position symmetrical about a loop of the flexion vibration wave (specification, pg. 35, line 24 to pg. 36, line 4). An amplifying circuit 22 amplifies the drive signal detected by the detecting polarized portion 18c and inputs the amplified signal to the driving polarized portion 18a to oscillate the piezoelectric vibrating member 16 (specification, pg. 36, lines 8-17).

In another aspect, the present invention is directed to an electronic apparatus. As shown in the embodiment of Fig. 32, for example, the electronic apparatus comprises a moving member 96 connected to a piezoelectric vibrating member 95 of an ultrasonic motor according to any of the foregoing embodiments of the present invention, an output mechanism 99, and a transmission mechanism 98 for transmitting movement of the moving member 96 to the output mechanism 99 (specification, pg. 77, line 13 to pg. 78, line 8).

By the foregoing construction of the ultrasonic motor and electronic apparatus of the present invention, the

arrangement of the detecting and driving polarized portions provides a self-excited oscillation driving circuit which has high stability and which is compact and economical to manufacture. Accordingly, the ultrasonic motor of the present invention can be rotated with highly improved motor performance, stability and environmental reliability as compared to the complex control and driving circuits employed by the conventional art.

(6) <u>Issue</u>

An issue presented by this appeal is whether the Examiner has made out a <u>prima facie</u> case of obviousness of the subject matter of claims 1-4, 22-32 and 48-51 in view of the teachings of Izukawa, Kataoka, Salomon, Iino '955 and Iino '138.

Another issue presented by this appeal is whether claims 1-4, 22-32 and 48-51 are unobvious under 35 U.S.C. §103 over Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138.

Another issue presented by this appeal is whether the Examiner has made out a <u>prima facie</u> case of obviousness of the subject matter recited in claims 6-14 and 35-47 in view of the teachings of Okazaki, Shirasaki, Ohtsuchi and Iino '955 or Iino '138.

Another issue presented by this appeal is whether claims 6-14 and 35-47 are unobvious under 35 U.S.C. §103 over Okazaki in view of Shirasaki or Ohtsuchi and further in view of Iino '955 or Iino '138.

(7) Grouping of Claims

In the final Office Action, claims 1-4, 22-32 and 48-51 were grouped together in one ground of rejection under 35 U.S.C. §103(a). Claims 6-14 and 35-47 were grouped together in another ground of rejection under 35 U.S.C. §103(a). Appellants respectfully submit that the rejected claims fall in the following groups, the claims in each group being separately patentable on their own merits for the reasons given below in section (8):

(a) Independent claims 1 and 48 and dependent claims 22-23 and 49-51;

(b) Independent claim 2 and dependent claims 24-25;

(c) Independent claim 3 and dependent claim 4, 10 and 26-32;

(d) Independent claim 6 and dependent claims 7-9 and 35-43; and

(e) Independent claims 11 and 12 and dependent claims 13, 14 and 44-47.

(8) Argument

Claims 1-4, 22-32 and 48-51 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138. Appellants respectfully disagree with this rejection and submit that the combined teachings of the references do not disclose or suggest the subject matter recited in claims 1-4, 22-32 and 48-51.

Independent Claims 1 and 48

Independent claim 1 is directed to an ultrasonic motor and requires a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to oscillate the piezoelectric vibrating member in self-excited oscillation to produce a drive force. Claim 1 further requires that the detecting polarized portion is disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member. Claim 1 further requires an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the driving polarized portion to oscillate the piezoelectric vibrating member.

Independent claim 48 is also directed to an ultrasonic motor and requires a piezoelectric vibrating member, and a driving circuit for applying an exciting signal to the piezoelectric vibrating member to oscillate the piezoelectric vibrating member in self-excited oscillation. Claim 48 further requires that the driving circuit has a detecting electrode for detecting the exciting signal and disposed at a portion of the piezoelectric vibrating member for undergoing maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member, a driving electrode for receiving the exciting signal, and an amplifying circuit for amplifying the exciting signal detected by the detecting electrode and inputting the amplified signal to the driving electrode.

Thus, independent claim 1 requires, in combination, a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to oscillate the piezoelectric vibrating member in <u>self-excited oscillation</u> to produce a drive force, and that <u>the detecting polarized portion is disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member</u>. Likewise, independent claim 48 requires, in

combination, a driving circuit for applying an exciting signal to the piezoelectric vibrating member to oscillate the piezoelectric vibrating member in self-excited oscillation, the driving circuit having a detecting electrode for detecting the exciting signal and disposed at a portion of the piezoelectric vibrating member for undergoing maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member. No corresponding structural combinations are disclosed or suggested by the prior art of record.

The Examiner stated that each of the primary references to Izukawa, Kataoka and Salomon teach drive circuits for a vibration motor using a polarized piezoelectric material for drive and detection electrodes. The Examiner acknowledged that each of the primary references does not teach a self-oscillating driving circuit, as required by independent claims 1 and 48, but pointed out that Iino '955 and Iino '138 teach that it is advantageous to drive piezoelectric vibration motors with self-oscillation drive circuitry to yield a stable operation and use less power. In view of this disclosure, the Examiner has taken the position that it would have been obvious to one of ordinary skill in the art to provide Izukawa, Kataoka or Salomon with self-oscillation drive circuitry.

Appellants vigorously disagree with the Examiner's interpretation of the claimed invention and with the combination of the prior art references relied upon by the Examiner in his statement of rejection.

It is well settled that the Examiner must satisfy his burden of establishing a prima facie case of obviousness by showing that some objective teaching or suggestion in the applied prior art taken as a whole and/or knowledge generally available to one of ordinary skill in the art would have led that person to the claimed invention, including each and every limitation of the claims, without recourse to the teachings in applicants' disclosure. See generally, In re Rouffet, 47 USPQ2d 1453, 1456, 1457-1458 (Fed. Cir. 1998); In re Oeticker, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992). In this case, the Examiner has failed to carry his burden of making out a prima facie case of obviousness with respect to the subject matter recited in independent claims 1 and 48 as set forth below.

First, it is unclear from the statement of rejection how the Examiner proposes to modify the vibration motors disclosed by Izukawa, Kataoka or Salomon to incorporate the self-oscillation drive circuitry disclosed by Iino '955 or Iino '138. Nevertheless, even if it were proper to modify Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138 in the manner proposed by the Examiner, the resulting combination would not result in the invention recited in

independent claim 1 which requires, in addition to self-oscillation drive circuitry, that the detecting polarized portion is disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member. Likewise, the combination proposed by the Examiner would not result in the invention recited in independent claim 48 which requires, in addition to self-oscillation drive circuitry, that the detecting electrode is disposed at a portion of the piezoelectric vibrating member for undergoing maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member. In the statement of rejection, the Examiner did not specifically address these structural features recited in independent claims 1 and 48. It is clear, however, that this feature is not disclosed or suggested by the prior art of record.

Izukawa is directed to a driving circuit of a vibration wave motor. A polarization pattern of an electrostrictive element 2 joined to a vibration member 1, as shown in Figs. 1B and 1C, is divided into a group 2a to which a periodic voltage is applied by an electrode 3, a group 2b to which a periodic voltage is applied by an electrode 4, and a vibration detecting group 2c. There is no teaching or suggestion in Izukawa of the vibration detecting group 2c

being disposed at a portion of the vibration member 1 which undergoes <u>maximum deformation in at least one vibration mode of oscillation</u> of the vibrating member, as required by independent claims 1 and 48. Furthermore, while Kataoka, Salomon, Iino '138 and Iino '955 are also directed to ultrasonic wave motor devices having a vibrating or oscillating member provided with detecting and driving polarized portions, none of these references teaches a detecting polarized portion disposed at a portion of the vibrating member or oscillating member which undergoes <u>maximum deformation in at least one vibration mode of oscillation</u> of the vibrating member or the oscillating member, as required by independent claims 1 and 48.

<u>Independent Claim 2</u>

Independent claim 2 is also directed to an ultrasonic motor and requires a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to produce a flexion vibration wave for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force. Claim 2 further requires that the detecting polarized portion is disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of

oscillation of the piezoelectric vibrating member and is disposed at a position symmetrical about a loop of the flexion vibration wave. Claim 2 further requires an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the driving polarized portion to oscillate the piezoelectric vibrating member.

Thus, independent claim 2 requires, in combination, a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to produce a flexion vibration wave for oscillating the piezoelectric vibrating member in <u>self-excited oscillation</u> to produce a drive force, and that <u>the detecting polarized portion is disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and is disposed at a position symmetrical about a loop of the flexion vibration wave</u>. No corresponding structural combination is disclosed or suggested by the prior art of record.

Izukawa, Kataoka, Salomon, Iino '138 and Iino '955 do not disclose or suggest a piezoelectric vibrating member having a detecting portion disposed at a portion of the piezoelectric vibrating member which undergoes <u>maximum</u>

deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member, as set forth above for independent claims 1 and 48. Furthermore, in the statement of rejection, the Examiner did not specifically address the explicitly recited feature that the detecting portion is also disposed at a position symmetrical about a loop of the flexion vibration wave, as required by independent claim 2. It is clear, however, that this feature is also not disclosed or suggested by Izukawa, Kataoka, Salomon, Iino '138 and Iino '955.

Independent Claim 3

Independent claim 3 is also directed to an ultrasonic motor and requires a piezoelectric vibrating member having a first driving polarized portion for generating a first flexion vibration wave, a second driving polarized portion for generating a second flexion vibration wave having a phase different from that of the first flexion vibration wave, and a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and disposed at a position symmetrical about a loop of one of the first flexion vibration wave and the second flexion vibration wave for detecting a drive signal having a drive frequency of the detecting polarized portion in accordance with oscillation of the first

driving polarized portion. Claim 3 further requires an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to one of the first and second driving polarized portions for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force.

Thus, independent claim 3 requires, in combination, a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes <u>maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member</u> and disposed at a position <u>symmetrical about a loop of one of the first flexion vibration wave and the second flexion vibration wave</u> for detecting a drive signal having a drive frequency of the detecting polarized portion in accordance with oscillation of the first driving polarized portion, and an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to one of the first and second driving polarized portions for oscillating the piezoelectric vibrating member in <u>self-excited oscillation</u> to produce a drive force. No corresponding structural combination is disclosed or suggested by the prior art of record.

Izukawa, Kataoka, Salomon, Iino '138 and Iino '955 do not disclose or suggest a piezoelectric vibrating member

having a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member, as set forth above for independent claims 1 and 48. Furthermore, in the statement of rejection, the Examiner did not specifically address the explicitly recited feature that the detecting portion is also disposed at a position symmetrical about a loop of one of the first flexion vibration wave and the second flexion vibration wave, as required by independent claim 3. It is clear, however, that this feature is also not disclosed or suggested by Izukawa, Kataoka, Salomon, Iino '138 and Iino '955.

The Examiner has thus failed to satisfy his *prima facie* burden of demonstrating obviousness under 35 U.S.C. §103. As noted by the Court of Appeals for the Federal Circuit in the case of *In re Fritch*, 23 USPQ 1780, 1783 (Fed. Cir. 1992):

> 'Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so.' *Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious 'modification' of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art*

> suggested the desirability of the modification. Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board.
>
> Here, the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that '[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.'"

The Federal Circuit has therefore made it clear that the prior art must show an incentive to modify its teachings in order to render a claim obvious. Without such an incentive, a prima facie rejection of obviousness cannot be made. Here, the Examiner has proposed modifications that would be required of Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138 but has ignored explicitly recited structural features of independent claims 1-3 and 48 as set forth above. In doing so, the Examiner has not set forth a prima facie obviousness rejection and the claim rejection should be reversed.

Moreover, irrespective of any teaching that might be afforded by the cited references, one of ordinary skill in the art would not have found it obvious to modify Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138 to arrive at the

invention recited in independent claims 1-3 and 48 as set forth above. Absent the suggestion afforded by appellants' own disclosure, there is no basis in the teachings of the references which would have led one skilled in the art to arrive at the invention recited in independent claims 1-3 and 48. Thus, the rejection of claims 1-3 and 48 on the basis of these references should not be sustained.

Claims 4, 22-23, 24-25, 26-32 and 49-51 depend on and contain all of the limitations of independent claims 1-3 and 48 and, therefore, distinguish from the references at least in the same manner as claims 1-3 and 48.

In view of the foregoing, appellants respectfully request that the rejection of claims 1-4, 22-32 and 48-51 under 35 U.S.C. §103(a) as being unpatentable over Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138 be reversed.

Claims 6-14 and 35-47[2] stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki in view of Shirasaki or Ohtsuchi and further in view of Iino '955.

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2 Claim 10 depends on and contains all of the limitations of independent claim 3. It appears that the Examiner inadvertently grouped claim 10 with the prior art rejection of claims 6-9, 11-14 and 35-47 instead of the prior art rejection of claims 1-4, 22-32 and 48-51. Nevertheless, appellants respectfully submit that dependent claim 10 distinguishes from Izukawa, Kataoka or Salomon in view of Iino '955 or Iino '138 at least in the same manner as set forth above for independent claim 3, from which claim 10 depends.

Appellants respectfully disagree with this rejection and submit that the combined teachings of the references do not disclose or suggest the subject matter recited in claims 6-9, 11-14 and 35-47.

Independent claim 6

Amended independent claim 6 is directed to an ultrasonic motor and requires a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and disposed at a position symmetrical about one of a node of the stretching vibration wave and a loop of the flexion vibration wave for detecting a drive signal having a drive frequency of the detecting polarized portion in accordance with oscillation of one of the first driving polarized portion and the second driving polarized portion, respectively. Claim 6 further requires amplifying means for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the first and second driving polarized portions for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force.

Thus, independent claim 6 requires, in combination, a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of

the piezoelectric vibrating member and disposed at a position symmetrical about one of a node of the stretching vibration wave and a loop of the flexion vibration wave, and amplifying means for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the first and second driving polarized portions for oscillating the piezoelectric vibrating member in <u>self-excited oscillation</u> to produce a drive force. No corresponding structural combination is disclosed or suggested by the prior art of record.

The Examiner stated that the primary reference to Okazaki teaches a piezoelectric vibration motor structure with a drive circuit. The Examiner acknowledged that Okazaki does not disclose or suggest the use of a self-oscillating feedback drive circuit. The Examiner has relied on the secondary references to Iino '955 and Iino '138 for their disclosure of the use of self-oscillation drive circuitry in ultrasonic wave motors. The Examiner has further relied on the secondary references to Shirasaki and Ohtsuchi for their disclosure of feedback circuitry utilizing polarized piezoelectric detecting electrodes. In view of this disclosure, the Examiner has taken the position that it would have been obvious to one of ordinary skill in the art to provide Okazaki with self-oscillation drive circuitry, as taught by Iino '955 and Iino

'138, and with feedback circuitry utilizing polarized piezoelectric detecting electrodes, as taught by Shirasaki and Ohtsuchi.

Appellants vigorously disagree with the Examiner's interpretation of the claimed invention and with the combination of the prior art references relied upon by the Examiner in his statement of rejection.

Okazaki discloses a vibration actuator for generating a driving force by generating plural vibrations in an elastic member. As recognized by the Examiner, Okazaki clearly does not disclose or suggest the structural combination of an ultrasonic motor having a detecting polarized portion <u>disposed at a portion of a piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member</u> and <u>disposed at a position symmetrical about one of a node of the stretching vibration wave and a loop of the flexion vibration wave</u>, and amplifying means for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the first and second driving polarized portions for oscillating the piezoelectric vibrating member in <u>self-excited oscillation</u> to produce a drive force, as required by independent claim 6.

The secondary reference to Shirasaki discloses a vibration driven motor having a vibration member and detection

members for detecting a vibration state of the vibration member (Figs. 1A-1B). Ohtsuchi discloses an ultrasonic motor having a vibrating body and vibration detection electrodes for detecting vibration amplitudes of the vibrating body. Thus, while Shirasaki and Ohtsuchi disclose vibration driven or ultrasonic motors which utilize detection members or electrodes for detecting an amplitude of vibration of a vibrating body to improve the driving efficiency and stability of the vibration driven or ultrasonic motor, these references do not disclose or suggest the specific structure of the ultrasonic motor required by independent claim 6. More specifically, Shirasaki and Ohtsuchi do not disclose or suggest a detecting polarized portion <u>disposed at a portion of a piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member</u> and <u>disposed at a position symmetrical about one of a node of the stretching vibration wave and a loop of the flexion vibration wave</u>, as required by independent claim 6. Furthermore, in the statement of rejection, the Examiner did not specifically point out where this structural feature required by independent claim 6 is disclosed by Shirasaki and/or Ohtsuchi. Nevertheless, it is clear that this structural feature is not disclosed or suggested by Shirasaki and/or Ohtsuchi as set forth above. Since Shirasaki and Ohtsuchi do not disclose or suggest this

structural feature of the ultrasonic motor recited in independent claim 6, they do not cure the deficiencies of Okazaki and, therefore, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Independent Claims 11 and 12

Independent claim 11 is also directed to an ultrasonic motor and requires a driving electrode disposed on the piezoelectric vibrating member for undergoing vertical vibration to vibrate the piezoelectric vibrating member in self-excited vibration to produce a drive force, a detecting electrode disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member, and an amplifying circuit for amplifying the drive signal detected by the detecting electrode and inputting the amplified drive signal to the driving electrode to vibrate the piezoelectric vibrating member.

Independent claim 12 is also directed to an ultrasonic motor and requires a piezoelectric vibrating member, a driving electrode disposed on the piezoelectric vibrating member for undergoing torsional vibration to vibrate the piezoelectric vibrating member in self-excited vibration to produce a drive force, and a detecting electrode for detecting a drive signal having a drive frequency of the

detecting electrode in accordance with vibration of the driving electrode, the detecting electrode being disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member. Independent claim 12 further requires an amplifying circuit for amplifying the drive signal detected by the detecting electrode and inputting the amplified drive signal to the driving electrode to vibrate the piezoelectric vibrating member.

Thus independent claims 11 and 12 require an ultrasonic motor having a detecting electrode <u>disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member</u>. In the statement of rejection, the Examiner did not specifically point out where this structure required by independent claims 11 and 12 is disclosed Shirasaki and/or Ohtsuchi. Nevertheless, it is clear that this feature is not disclosed or suggested by Shirasaki and/or Ohtsuchi as set forth above for the rejection of independent claim 6. Since Shirasaki and Ohtsuchi do not disclose or suggest this structural feature of the ultrasonic motor recited in independent claims 11 and 12,

they do not cure the deficiencies of Okazaki and, therefore, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Moreover, the cited references do not disclose or suggest <u>a detecting electrode for detecting a drive signal having a drive frequency of the detecting electrode in accordance with vibration of the driving electrode</u>, as recited in independent claims 11 and 12. For example, Ohtsuchi discloses a vibration detection electrode for detecting an amplitude of vibration of a vibrating body, <u>not</u> a drive signal.

Thus, with respect to independent claims 6, 11 and 12, the Examiner has proposed modifications that would be required of Okazaki in view of Shirasaki and/or Ohtsuchi and further in view of Iino '955 or Iino '138 but has ignored explicitly recited structural features of these independent claims as set forth above. In doing so, the Examiner has not set forth a <u>prima</u> <u>facie</u> obviousness rejection and the claim rejection should be reversed.

Moreover, irrespective of any teaching that might be afforded by the cited references, one of ordinary skill in the art would <u>not</u> have found it obvious to modify Okazaki in view of Shirasaki or Ohtsuchi and further in view of Iino '955 or Iino '138 to arrive at the invention recited in independent claims 6, 11 and 12 as set forth above. Absent the suggestion

afforded by appellants' own disclosure, there is no basis in the teachings of the references which would have led one skilled in the art to arrive at the invention recited in independent claims 6, 11 and 12. Thus, the rejection of claims 6, 11 and 12 on the basis of these references should not be sustained.

Claims 7-9, 13, 14, 35-43, 44-45 and 46-47 depend on and contain all of the limitations of independent claims 6, 11 and 12 and, therefore, distinguish from the references at least in the same manner as claims 6, 11 and 12.

In view of the foregoing, appellants respectfully request that the rejection of claims 6-14 and 33-47 under 35 U.S.C. §103(a) as being unpatentable over Okazaki in view of Shirasaki or Ohtsuchi and further in view of Iino '955 or Iino '138 be reversed.

In view of the foregoing, appellants respectfully submit that claims 1-4, 6-14, 22-32 and 35-51 patentably distinguish over the prior art of record and, therefore, the

rejections of these claims under 35 U.S.C. §103(a) should not be sustained.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Appellants

By: Bruce L. Adams

Bruce L. Adams
Reg. No. 25,386

50 Broadway
31st Floor
New York, NY 10004
(212) 809-3700

MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents & Trademarks, Washington, D.C. 20231, on the date indicated below.

Bruce L. Adams
Attorney Name

Bruce L. Adams
Signature

JUNE 13, 2001
Date

(9) Appendix

Appealed claims 1-4, 6-14, 22-32 and 35-51 are reproduced below in smooth form.

1. An ultrasonic motor comprising: a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to oscillate the piezoelectric vibrating member in self-excited oscillation to produce a drive force, the detecting polarized portion being disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member; and an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the driving polarized portion to oscillate the piezoelectric vibrating member.

2. An ultrasonic motor comprising: a piezoelectric vibrating member having a detecting polarized portion for detecting a drive signal having a drive frequency of the detecting polarized portion and a driving polarized portion for receiving the drive signal to produce a flexion vibration wave for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force,

the detecting polarized portion being disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and being disposed at a position symmetrical about a loop of the flexion vibration wave; and an amplifying circuit for amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the driving polarized portion to oscillate the piezoelectric vibrating member.

3. An ultrasonic motor comprising: a piezoelectric vibrating member having a first driving polarized portion for generating a first flexion vibration wave, a second driving polarized portion for generating a second flexion vibration wave having a phase different from that of the first flexion vibration wave, and a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and disposed at a position symmetrical about a loop of one of the first flexion vibration wave and the second flexion vibration wave for detecting a drive signal having a drive frequency of the detecting polarized portion in accordance with oscillation of the first driving polarized portion; and an amplifying circuit for amplifying the drive signal detected by the

detecting polarized portion and inputting the amplified signal to one of the first and second driving polarized portions for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force.

4. An ultrasonic motor according to claim 3; further comprising a phase shift circuit for shifting a phase of the drive signal amplified by the amplifying circuit and inputting the drive signal shifted in phase to the other of the first and second driving polarized portions.

6. An ultrasonic motor comprising: a piezoelectric vibrating member having a first driving polarized portion for generating a stretching vibration wave, a second driving polarized portion for generating a flexion vibrating wave, and a detecting polarized portion disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member and disposed at a position symmetrical about one of a node of the stretching vibration wave and a loop of the flexion vibration wave for detecting a drive signal having a drive frequency of the detecting polarized portion in accordance with oscillation of one of the first driving polarized portion and the second driving polarized portion, respectively; and amplifying means for

amplifying the drive signal detected by the detecting polarized portion and inputting the amplified signal to the first and second driving polarized portions for oscillating the piezoelectric vibrating member in self-excited oscillation to produce a drive force.

7. An ultrasonic motor according to claim 6; wherein the detecting polarized portion is disposed symmetrical about the node of the stretching vibration wave for detecting the drive signal in accordance with oscillation of the first driving polarized portion.

8. An ultrasonic motor according to claim 7; wherein the amplifying means includes means for feeding the amplified signal back to one of the first and second driving polarized portions.

9. An ultrasonic motor according to claim 8; further comprising a phase shift circuit disposed between the amplifying means and one of the first and second driving polarized portions for shifting a phase of the drive signal amplified by the amplifying means.

10. An ultrasonic motor according to claim 3; wherein the piezoelectric vibrating member is generally cylindrical-shaped and has an end face disposed at a maximum

displacement point for undergoing movement by the oscillation generated by the first flexion vibrating wave and the second flexion vibrating wave.

11. An ultrasonic motor comprising: a piezoelectric vibrating member; a driving electrode disposed on the piezoelectric vibrating member for undergoing vertical vibration to vibrate the piezoelectric vibrating member in self-excited vibration to produce a drive force; a detecting electrode for detecting a drive signal having a drive frequency of the detecting electrode in accordance with vibration of the driving electrode, the detecting electrode being disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member; and an amplifying circuit for amplifying the drive signal detected by the detecting electrode and inputting the amplified drive signal to the driving electrode to vibrate the piezoelectric vibrating member.

12. An ultrasonic motor comprising: a piezoelectric vibrating member; a driving electrode disposed on the piezoelectric vibrating member for undergoing torsional vibration to vibrate the piezoelectric vibrating member in self-excited vibration to produce a drive force; a detecting

electrode for detecting a drive signal having a drive frequency of the detecting electrode in accordance with vibration of the driving electrode, the detecting electrode being disposed at a portion of the piezoelectric vibrating member which undergoes maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member; and an amplifying circuit for amplifying the drive signal detected by the detecting electrode and inputting the amplified drive signal to the driving electrode to vibrate the piezoelectric vibrating member.

13. An ultrasonic motor according to claim 11; wherein the detecting electrode is spaced apart from the driving electrode in a vertical vibrating direction thereof.

14. An ultrasonic motor according to claim 12; wherein the detecting electrode is spaced apart from the driving electrode in a thickness direction thereof.

22. An ultrasonic motor according to claim 1; wherein the detecting polarized portion overlies and is integral with the driving polarized portion.

23. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 1; a moving member

connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

24. An ultrasonic motor according to claim 2; wherein the detecting polarized portion overlies and is integral with the driving polarized portion.

25. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 2; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

26. An ultrasonic motor according to claim 3; wherein the detecting polarized portion overlies and is integral with the driving polarized portion.

27. An ultrasonic motor according to claim 3; further comprising a phase shift circuit for shifting a phase of the drive signal amplified by the amplifying circuit; and

a buffer circuit having a high input impedance and a low output impedance disposed between the amplifying circuit and the phase shift circuit.

28. An ultrasonic motor according to claim 27; further comprising a second amplifying circuit disposed between the phase shift circuit and the second driving polarized portion for amplifying the drive signal shifted in phase by the phase shift circuit.

29. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 3; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

30. An ultrasonic motor according to claim 4; wherein the detecting polarized portion overlies and is integral with the driving polarized portion.

31. An ultrasonic motor according to claim 4; further comprising a buffer circuit having a high input impedance and a low output impedance disposed between the amplifying circuit and the phase shift circuit.

32. An ultrasonic motor according to claim 31; further comprising a second amplifying circuit disposed between the phase shift circuit and the second driving polarized portion for amplifying the drive signal shifted in phase by the phase shift circuit.

35. An ultrasonic motor according to claim 6; wherein the amplifying means includes means for feeding the amplified signal back to one of the first and second electrodes.

36. An ultrasonic motor according to claim 6; wherein the detecting electrode overlies and is integral with the driving electrode.

37. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 6; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

38. An ultrasonic motor according to claim 6; wherein the detecting polarized portion is disposed symmetrical about the loop of the flexion vibration wave for

detecting the drive signal in accordance with the second driving polarized portion.

39. An ultrasonic motor according to claim 7; wherein the detecting electrode overlies and is integral with the driving electrode.

40. An ultrasonic motor according to claim 8; wherein the detecting electrode overlies and is integral with the driving electrode.

41. An ultrasonic motor according to claim 9; wherein the detecting electrode overlies and is integral with the driving electrode.

42. An ultrasonic motor according to claim 9; further comprising a buffer circuit having a high input impedance and a low output impedance disposed between the amplifying circuit and the phase shift circuit.

43. An ultrasonic motor according to claim 42; further comprising a second amplifying circuit disposed between the phase shift circuit and the second driving polarized portion for amplifying the drive signal shifted in phase by the phase shift circuit.

44. An ultrasonic motor according to claim 11; wherein the detecting electrode is disposed on a portion of the driving electrode.

45. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 11; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

46. An ultrasonic motor according to claim 12; wherein the detecting electrode is disposed on a portion of the driving electrode.

47. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 12; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.

48. An ultrasonic motor comprising: a piezoelectric vibrating member; and a driving circuit for applying an exciting signal to the piezoelectric vibrating member to

oscillate the piezoelectric vibrating member in self-excited oscillation, the driving circuit having a detecting electrode for detecting the exciting signal and disposed at a portion of the piezoelectric vibrating member for undergoing maximum deformation in at least one vibration mode of oscillation of the piezoelectric vibrating member, a driving electrode for receiving the exciting signal, and an amplifying circuit for amplifying the exciting signal detected by the detecting electrode and inputting the amplified signal to the driving electrode.

49. An ultrasonic motor according to claim 48; wherein the exciting signal has a drive frequency of the detecting electrode.

50. An ultrasonic motor according to claim 48; further comprising a phase shift circuit for shifting a phase of the exciting signal amplified by the amplifying circuit.

51. An electronic apparatus comprising: an ultrasonic motor as claimed in claim 48; a moving member connected to the piezoelectric vibrating member of the ultrasonic motor for undergoing movement in accordance with oscillation of the piezoelectric vibrating member; an output mechanism; and a transmission mechanism for transmitting movement of the moving member to the output mechanism.